CLAIMS

1. An optical switch comprising:

an optical-fiber-arraying-member in which a plurality of optical fiber fixing grooves extending along radial directions of a virtual circle are radially formed in a predetermined surface of a base material;

a plurality of array-side optical fibers arrayed in said plurality of optical fiber fixing grooves of said optical-fiber-arraying-member; and

a moving-side optical fiber to be selectively optically connected to either of said plurality of array-side optical fibers,

wherein said moving-side optical fiber and said optical-fiber-arraying-member are rotated relative to each other about a center axis of said virtual circle to select said array-side optical fiber to be optically connected to said moving-side optical fiber.

2. The optical switch according to Claim 1, comprising a carrying device for carrying said moving-side optical fiber, and an arraying-member rotating device for rotating said optical-fiber-arraying-member, wherein said moving-side optical fiber is optically connected to said array-side optical fiber by said carrying device and said arraying-member rotating device.

3. The optical switch according to Claim 1, wherein said array-side optical fibers are arrayed so that end faces thereof are directed toward the center axis of said virtual circle.

4. The optical switch according to Claim 1, wherein said array-side optical fibers are arrayed so that end faces thereof are directed along directions opposite to those toward the center axis of said virtual circle.

5. The optical switch according to Claim 1, wherein said base material is of a prism shape, said plurality of optical fiber fixing grooves are radially formed in at least two side faces of said base material, said base material and said moving-side optical fiber are rotated relative to each other about a center axis of the prism to select one side face of said base material, and said moving-side optical fiber is optically connected to either of said array-side optical fibers arrayed on said one side face selected.

6. The optical switch according to Claim 5, comprising base-material rotating means for rotating said base material about the center axis of the prism, a carrying device for carrying said moving-side optical fiber, and a moving-side-fiber rotating device for rotating said moving-side optical fiber about the center axis of said virtual circle, wherein said

moving-side optical fiber is optically connected to said array-side optical fiber by said base-material rotating means, said carrying device, and said moving-side-fiber rotating device.

7. The optical switch according to Claim 1, wherein said base material is of a pyramid shape, said plurality of optical fiber fixing grooves are radially formed in at least two side faces of said base material, said base material and said moving-side optical fiber are rotated relative to each other about a center axis of the pyramid to select one side face of said base material, and said moving-side optical fiber is optically connected to either of said array-side optical fibers arrayed on said one side face selected.

8. The optical switch according to Claim 7, comprising base-material rotating means for rotating said base material about the center axis of the pyramid, a carrying device for carrying said moving-side optical fiber, and a moving-side-fiber rotating device for rotating said moving-side optical fiber about the center axis of said virtual circle, wherein said moving-side optical fiber is optically connected to said array-side optical fiber by said base-material rotating means, said carrying device, and said moving-side-fiber rotating device.

9. The optical switch according to Claim 7,

wherein said array-side optical fibers are arrayed so that end faces thereof are directed toward a vertex of the pyramid.

10. The optical switch according to Claim 7, wherein said array-side optical fibers are arrayed so that end faces thereof are directed along directions opposite to those toward a vertex of the pyramid.

11. The optical switch according to Claim 1, wherein said moving-side optical fiber comprises a plurality of optical fibers and each moving-side optical fiber is positioned on said optical-fiber-arraying-member by a pressing member of an arcuate shape having the same center as said virtual circle.

12. An optical switch comprising:

an optical-fiber-arraying-member in which a plurality of optical fiber fixing grooves are formed along a direction of a generator of a cylindrical side face of a base material, which has one of the cylindrical side surface and part of the cylindrical side surface as its own side face;

a plurality of array-side optical fibers arrayed in said plurality of optical fiber fixing grooves of said optical-fiber-arraying-member; and

a moving-side optical fiber to be selectively optically connected to either of said plurality of array-side optical fibers,

wherein said moving-side optical fiber and said optical-fiber-arraying-member are rotated relative to each other about a center axis of said cylinder and said moving-side optical fiber is optically connected to said array-side optical fiber.

13. The optical switch according to Claim 12, comprising a carrying device for carrying said moving-side optical fiber, and an arraying-member rotating device for rotating said optical-fiber-arraying-member about the center axis of the cylinder, wherein said moving-side optical fiber is selectively optically connected to said array-side optical fiber by said carrying device and said arraying-member rotating device.

14. The optical switch according to Claim 12, wherein said moving-side optical fiber comprises a plurality of optical fibers, each moving-side optical fiber is positioned on said optical-fiber-arraying-member by a pressing member having a curved press surface, and a radius of curvature of said curved press surface is approximately equal to a radius of curvature of said cylinder.

15. An optical switch comprising:

an optical-fiber-arraying-member in which a plurality of optical fiber fixing grooves are formed along directions of a generator of a conical side face

of a base material, which has one of the conical side face and part of the conical side face as its own side face;

a plurality of array-side optical fibers arrayed in said plurality of optical fiber fixing grooves of said optical-fiber-arraying-member; and

a moving-side optical fiber to be selectively optically connected to either of said plurality of array-side optical fibers,

wherein said moving-side optical fiber and said optical-fiber-arraying-member are rotated relative to each other about a center axis of said cone and said moving-side optical fiber is selectively optically connected to said array-side optical fiber.

16. The optical switch according to Claim 15, comprising a carrying device for carrying said moving-side optical fiber, and an arraying-member rotating device for rotating said optical-fiber-arraying-member about the center axis of the cone, wherein said moving-side optical fiber is selectively optically connected to said array-side optical fiber by said carrying device and said arraying-member rotating device.

17. The optical switch according to Claim 15, wherein said array-side optical fibers are arrayed so that end faces thereof are directed toward a vertex of the cone.

18. The optical switch according to Claim 15, wherein said array-side optical fibers are arrayed so that end faces thereof are directed along directions opposite to those toward a vertex of the cone.

19. The optical switch according to Claim 15, wherein said moving-side optical fiber comprises a plurality of optical fibers, each moving-side optical fiber is positioned on said optical-fiber-arraying-member by a pressing member having a curved press surface, and a radius of curvature of said curved press surface is approximately equal to a radius of curvature of said cone at a press position.

20. An optical-fiber-arraying-member wherein a plurality of optical fiber fixing grooves extending along radial directions of a virtual circle are radially formed in a predetermined surface of a base material.

21. The optical-fiber-arraying-member according to Claim 20, wherein said base material is of a prism shape and a plurality of optical fiber fixing grooves are radially formed in at least two side faces of said base material.

22. The optical-fiber-arraying-member according to Claim 21, wherein said base material is of a pyramid shape and a plurality of optical fiber fixing grooves are radially formed in at least two side faces of said

base material.

23. An optical-fiber-arraying-member comprising a base material having one of a cylindrical side face and part of the cylindrical side face as its own side face, wherein a plurality of optical fiber fixing grooves are formed along a direction of a generator of the cylindrical side face of said base material.

24. An optical-fiber-arraying-member comprising a base material having one of a conical side face and part of the conical side face as its own side face, wherein a plurality of optical fiber fixing grooves are formed along directions of a generator of the conical side face of said base material.

25. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of forming an optical fiber fixing groove in a predetermined surface of a base material by linearly moving a cutting tool along a radial direction of a virtual circle and a step of rotating said base material and the moving direction of said cutting tool relative to each other by a predetermined angle about a center axis of said virtual circle, thereby radially forming a plurality of optical fiber fixing grooves in said base material.

26. The production method of the optical-fiber-arraying-member according to Claim 25, wherein said

base material is of a prism shape and said base material and said cutting tool are rotated relative to each other about a center axis of the prism to determine a side face of said base material in which said optical fiber fixing grooves are to be formed.

27. The production method of the optical-fiber-arraying-member according to Claim 25, wherein said base material is of a pyramid shape and said base material and said cutting tool are rotated relative to each other about a center axis of the pyramid to determine a side face of said base material in which said optical fiber fixing grooves are to be formed.

28. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of moving a cutting tool along a direction of a generator of a cylindrical side surface of a base material, which has one of the cylindrical side face and part of the cylindrical side face as its own side face, to form an optical fiber fixing groove in said base material and a step of rotating said cutting tool and said base material relative to each other by a predetermined angle about a center axis of said cylinder, thereby forming a plurality of optical fiber fixing grooves parallel to each other on the cylindrical side face of said base material.

29. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of linearly moving a cutting tool along one direction of a base material to form an optical fiber fixing groove in a predetermined surface of the base material and a step of moving the moving direction of said cutting tool and said base material relative to each other in a direction perpendicular to said one direction, thereby forming a plurality of optical fiber fixing grooves parallel to each other in said base material, wherein bottoms of said respective fiber fixing grooves are located on a side face of a virtual cylinder.

30. A method of producing an optical-fiber-arraying-member, comprising a process of forming a plurality of optical fiber fixing grooves in a surface of a base material of a flat plate shape and thereafter deforming said base material so that a surface of said base material becomes part of a side face of a cylinder.

31. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of moving a cutting tool along a direction of a generator of a conical side face of a base material, which has one of the conical side face and part of the conical side face as its own side face, to form an optical fiber fixing groove in said

base material and a step of rotating said cutting tool and said base material relative to each other by a predetermined angle about a center axis of said cone, thereby forming a plurality of optical fiber fixing grooves on the conical side face of said base material.

32. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of forming an optical fiber fixing groove with a stamp member having a groove-forming rib by pushing said groove-forming rib against a predetermined surface of a base material along a radial direction of a virtual circle and a step of rotating an extending direction of said groove-forming rib of said stamp member and said base material relative to each other by a predetermined angle about a center axis of said virtual circle, thereby radially forming a plurality of optical fiber fixing grooves in said base material.

33. The production method of the optical-fiber-arraying-member according to Claim 32, wherein said base material is of a prism shape and said base material and said stamp member are rotated relative to each other about a center axis of the prism to determine a side face of said base material in which said optical fiber fixing grooves are to be formed.

34. The production method of the optical-fiber-

arraying-member according to Claim 32, wherein said base material is of a pyramid shape and said base material and said stamp member are rotated relative to each other about a center axis of the pyramid to determine a side face of said base material in which said optical fiber fixing grooves are to be formed.

35. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of forming an optical fiber fixing groove with a stamp member having a groove-forming rib by pushing said groove-forming rib along a direction of a generator of a cylindrical side face of a base material, which has one of the cylindrical side face and part of the cylindrical side face as its own side face and a step of rotating said stamp member and said base material relative to each other by a predetermined angle about a center axis of said cylinder, thereby forming a plurality of optical fiber fixing grooves parallel to each other in the cylindrical side face of said base material.

36. A method of producing an optical-fiber-arraying-member, comprising a process of alternately repeating plural times a step of forming an optical fiber fixing groove with a stamp member having a groove-forming rib by pushing said groove-forming rib along a direction of a generator of a conical side face

of a base material, which has one of the conical side face and part of the conical side face as its own side face and a step of rotating said stamp member and said base material relative to each other by a predetermined angle about a center axis of said cone, thereby forming a plurality of optical fiber fixing grooves in the conical side face of said base material.

37. A method of arraying optical fibers, comprising:

a step of preparing an optical-fiber-arraying-member in which a plurality of optical fiber fixing grooves extending along radial directions of a virtual circle are radially formed in a predetermined surface of a base material;

a step of arraying and fixing a plurality of array-side optical fibers to be optically connected to a moving-side optical fiber, in said plurality of optical fiber fixing grooves; and

a step of rotating a cylindrical edge of a cylindrical shape about a center axis of said virtual circle to cut ends of said plurality of array-side optical fibers to align the ends.

38. The method of arraying optical fibers according to Claim 37, wherein said base material is of a prism shape, said plurality of optical fiber fixing grooves are radially formed in at least two side faces

of the base material, said base material and said cylindrical edge are rotated relative to each other about a center axis of the prism to select one side face, and ends of the array-side optical fibers arrayed on said one side face selected are cut to be aligned by said cylindrical edge.

39. The method of arraying optical fibers according to Claim 37, wherein said base material is of a pyramid shape, said plurality of optical fiber fixing grooves are radially formed in at least two side faces of the base material, said base material and said cylindrical edge are rotated relative to each other about a center axis of the pyramid to select one side face, and ends of array-side optical fibers arrayed on said one side face selected are cut to be aligned by said cylindrical edge.

40. A method of arraying optical fibers, comprising:

a step of preparing an optical-fiber-arraying-member in which a plurality of optical fiber fixing grooves extending along a direction of a generator of a cylindrical side face of a base material, which has one of the cylindrical side face and part of the cylindrical side face as its won side face, are formed in parallel to each other;

a step of arraying and fixing a plurality of

array-side optical fibers to be optically connected to a moving-side optical fiber, in said plurality of optical fiber fixing grooves; and

a step of rotating a rotary blade having a rotation axis parallel to a center axis of said cylinder and rotating said base material and said rotary blade relative to each other about the center axis of said cylinder, thereby cutting ends of said plurality of array-side optical fibers to align the ends.

41. A method of arraying optical fibers, comprising:

a step of preparing an optical-fiber-arraying-member in which a plurality of optical fiber fixing grooves extending along directions of a generator of a conical side face of a base material, which has one of the conical side face and part of the conical side face as its own side face, are formed;

a step of arraying and fixing a plurality of array-side optical fibers to be optically connected to a moving-side optical fiber, in said plurality of optical fiber fixing grooves; and

a step of rotating a rotary blade having a rotation axis parallel to a center axis of said cone and rotating said base material and said rotary blade relative to each other about the center axis of said

cone, thereby cutting ends of said plurality of array-side optical fibers to align the ends.